

**Landsat 7
Processing System (LPS)
System Test Procedures**

Build 1

April 19, 1996

**GODDARD SPACE FLIGHT CENTER
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Glossary

Section 1 -- Introduction

1.1 SCOPE

This document provides the necessary procedures to verify the LPS system requirements. The list of requirements is taken from the LPS Build Implementation Plan (BIP) November 1995. This document is based on the Landsat 7 Processing System (LPS) Integration and Test Plan. It defines the test assumptions and constraints, test data, test tools, system configuration, a mapping of requirements to test cases is in appendix A.

1.1.1 OBJECTIVE

The System test of Build 1 is focusing on the following items:

- Raw data handling which includes subinterval determination, operator support for status and error message.
- Manual data capture.
- Status and error monitoring.
- Limited scope of the level 0R data processing (building MSCD and DAN files).

1.1.2 LIMITATIONS

The following is a list of system test limitations for the Build 1 testing effort:

- Limited operator support in the form of status and error messages.
- The Landsat 7 wideband data are not fully processed and the Level 0R files are limited to MSCD files.
- The electronic interface with LGS is not available.

1.1.3 APPROACH

1.1.3.1 Testing

The strategy for testing Build 1 is to focus on manual data capture and basic raw data handling. The nominal data is captured and processed first to baseline the normal data operation, then different errors are introduced to verify the system error handling capability. Finally, the level 0R data processing is executed.

The Build 1 database contains specific static values that are provided by development in a set of scripts. It is built by CM. The scripts change appropriate schema and static values. The database for system level testing resides on the lps001.

This database will be refined as system testing progresses. Dynamic value changes will be made to the database to meet specific test objectives. These dynamic changes will not be incorporated into the database baseline. Any changes to the baseline database during testing will be documented via the ICCR form. Upon completion of this test phase, the refined export file will also be placed under CM control.

1.1.3.2 Data

- The Landsat 7 wideband data were generated by GTSIM.

1.2 APPLICABLE DOCUMENTS

This test procedures document was developed using the documents listed below.

1. Lockheed Martin Astro Space, 23007702-IVC, Landsat 7 System Data Format Control Book (DFCB) Volume IV-Wideband Data, Revision C, 15 September 1995.
2. Computer Sciences Corporation, 514-2ITP/0195, Landsat 7 Processing System (LPS) Integration and Test Plan, November 1995.
3. --, 514-4BIP/0195, Landsat 7 Processing System (LPS) Build Implementation Plan, November 1995.
4. --, 560-3OCD/0194, Landsat 7 Processing System (LPS) Operations Concept, Revision 1, July 14, 1995.
5. Goddard Space Flight Center, 560-8SWR/xxx, Landsat 7 Processing System (LPS) User's Guide, October 20, 1995.
6. --, 560-8FPS/0194, Landsat 7 Processing System (LPS) Functional and Performance Specification, Revision 1, November 1995.

1.3 DEFINITIONS

The glossary located in this document contains the acronyms commonly used by the LPS project.

Section 2 -- LPS System Test Considerations

2.1 ASSUMPTIONS AND CONSTRAINTS

The database will be populated with the values agreed upon by the LPS system engineering as the baseline system test values for the database. The testing effort will use these values unless so noted in the test procedures for a given test case.

2.2 TEST DATA AND TEST TOOLS

The individual test cases in this document detail the test data and tools to be used.

2.2.1 TEST DATA

The following is a list of data files that will be used during verification:

Test Case(s)	File Name *	Data Characteristics
1.01 1.03 1.09 1.10 2.01 3.01 4.35 7.04 7.06 7.10	LPS.NORM.DATA_1 (format 1) LPS.NORM.DATA_2 (format 2)	Nominal wideband data containing 450 major frames. Both scene format 1 and 2 are included.
3.07	LPS.TC.3.07.DAT	Nominal wideband data that crosses a year boundary. First half of data starts with 1995/365; second half of data starts with 1996/001. The data size is 500 major frames and scene format is 1.
3.09	LPS.TC.3.09.DAT	Nominal wideband data that crosses the boundary from day 365 to day 366. The data size is 450 major frames and scene format is 1.
3.12	LPS.TC.3.12.DAT	Nominal wideband data in which the VCDU counter rolls over. The data size is 450 major frames and scene format is 1.
3.13	LPS.NORM.DATA_1_2	Nominal wideband data in which the format changes from Format 1 to Format 2. The data size is 450 major frames.
3.14	LPS.NORM.DATA_2_1	Nominal wideband data in which the format changes from Format 2 to Format 1. The data size is 450 major frames.
3.15	LPS.NORM.DATA_1_2_1	Nominal wideband data in which the format changes from Format 1 to Format 2 then back to Format 1. The data size is 450 major frames.
1.12 2.06 S3.03	LPS.NORM.BIG_DATA_1 (format 1) LPS.NORM.BIG_DATA_2 (format 2)	Nominal wideband data containing 750 major frames. Both scene format 1 and 2 are included.
4.10	LPS.TC.4.10.DAT	Raw wideband data containing 2% of 3 bit errors in the data pointer field. The data size is 450 major frames and scene format is 1.
4.11	LPS.TC.4.11.DAT	Raw wideband data containing 2% of 5 bit errors in the data pointer fields. The data size is 450 major frames and scene format is 1.

4.12	LPS.TC.4.12.DAT	Raw wideband data containing 2% of 3 bit errors in the mission data. The data size is 450 major frames and scene format is 1.
4.13	LPS.TC.4.13.DAT	Raw wideband data containing 1% of 25 bit errors in the mission data. The data size is 450 major frames and scene format is 1.
4.14	LPS.TC.4.14.DAT	Raw wideband data containing 2% of inverted CADUs. The data size is 450 major frames and scene format is 1.
4.15	LPS.TC.4.15.DAT	Raw wideband data containing 2% of inverted CADUs and 1 CADU with partially inverted polarity data. The data size is 450 major frames and scene format is 1.
4.16	LPS.TC.4.16.DAT	Raw wideband data containing one 25 sec. forward time jump at major frame #300, three 20 sec. forward time jump in other 3 major frames. The data size is 450 major frames and scene format is 1.
4.17	LPS.TC.4.17.DAT	Raw wideband data containing one 24-hour backward time jump at major frame #300, three 20 sec backward time jumps in other 3 major frames. The data size is 450 major frames and scene format is 1.
4.18	LPS.TC.4.18.DAT	Raw wideband data containing ten forward time jumps ranging in size from 5 seconds to 30 seconds. The data size is 450 major frames and scene format is 2.
4.19	LPS.TC.4.19.DAT	Raw wideband data containing ten backward time jumps ranging in size from 5 seconds to 30 seconds. The data size is 450 major frames and scene format is 2.
4.20	LPS.TC.4.20.DAT	Raw wideband data containing 1% of 3 bit errors and 1% of 5 bit errors in the Line Sync Code. The data size is 450 major frames and scene format is 1.
4.23	LPS.TC.4.23.DAT	Raw wideband data containing 1% of the VCDU version errors. The data size is 450 major frames and scene format is 1.
4.25	LPS.TC.4.25.DAT	Raw wideband data containing 2% of the incorrect VCDUs (values of 0,3,4, and 6). The data size is 450 major frames and scene format is 1.
4.26	LPS.TC.4.26.DAT	Raw wideband data containing 1% of 3 bit errors and 1% of 5 bit errors in the VCDU Header Error Control Field. The data size is 450 major frames and scene format is 1.
4.27	LPS.TC.4.27.DAT	Raw wideband data containing 1% of 3 bit errors and 1% of 5 bit errors in the CADU sync pattern. The data size is 450 major frames and scene format is 1.
4.28	LPS.TC.4.28.DAT	Raw Format 1 wideband data containing 1% of VCID errors (looks like Format 2). The data size is 450 major frames and scene format is 1.
4.29	LPS.TC.4.29.DAT	Raw wideband data containing 1% of valid CADU sync pattern in the Mission Data area. The data size is 450 major frames and scene format is 1.

4.30	LPS.TC.4.30.DAT	Raw wideband data containing 1% of valid line sync patterns in the Mission Data area. The data size is 450 major frames and scene format is 1.
4.32	LPS.TC.4.32.DAT	Raw wideband data containing 1% of 3 bit errors and 1% of 5 bit errors in the End of Line Pattern Code. The data size is 450 major frames and scene format is 1.
4.34	LPS.TC.4.34.DAT	Raw wideband data containing 1% of fill VCDUs. The data size is 450 major frames and scene format is 1.
4.36	LPS.TC.4.36.DAT	Raw wideband data containing 1% of the VCDU counter errors. The data size is 450 major frames and scene format is 1.

* All data files are stored under the lpsdev1:/u02/data path.

2.2.2 TEST TOOLS

The test tools used during system testing of Build 1 are listed below:

- Generic Telemetry Simulator (GTSIM) -- used to generate simulated wideband data.
- GTSIM utilities --
 1. gtedit: used to modify the telemetry file.
 2. flipbits: used to incorporate bit errors at specified locations.
 3. locslip: used to incorporate left and right bit shifts at specified locations.
 4. gtdump: used to compare raw data files and to dump values of specified parameters.
 5. cppart: used to split raw data files into smaller files.
- SyncDump -- used to generate hex dumps of up to 10 CADUs of the raw data.
- CADU dump -- used to generate a dump containing CADU summary information.
- MSCD file dump -- used to generate a dump of MSCD files.
- clean-db -- used to delete data from dynamic database tables.
- check-static-tables -- used to compare contents of database tables to a baseline.
- dump-db -- used to generate a dump of database tables.
- look-db -- used to view the list of the database tables and select the specific table(s).
- mzuser -- used to provide data playback.
- lps_Kill -- used to kill processes without having to specify a PID.
- fill_it -- used to fill a storage device with temporary files.

2.3 SYSTEM CONFIGURATION

Figure 2-1 describes the system configuration for Build 1.

Figure 2-1 Build 1 System Configuration

2.4 TEST SCHEDULE

Planned Date	Event
3/29/96	Test Procedure Walkthrough
4/19/96	System Test Readiness Review
4/26/96	Turnover to CM
4/29/96 - 5/1/96	Build and confidence testing
5/2/96 - 5/3/96	1.01 Start Manual Data Receipt Per Operator Directive 2.01 Write Nominal Raw Wideband Data to Disk 7.04 Manually Start Data Processing of Nominal Data
5/6/96 - 5/10/96	3.01 Process A File of Nominal Raw Wideband Data 3.13 Process Raw Wideband Data in which the Format Changes from Format 1 to Format 2 3.14 Process Raw Wideband Data in which the Format Changes from Format 2 to Format 1 7.01 Monitor LPS System Initialization 7.02 Startup the LPS Interface for Each Operational String 7.10 Monitor Nominal Wideband Data Processing
5/13/96 - 5/17/96	2.06 Write Nominal Raw Wideband Data to Disk with Insufficient Space 3.07 Process raw wideband data containing a forward jump across a year boundary 3.09 Process raw wideband data that crosses the boundary from day 365 to day 366 3.15 Process Raw Wideband Data in which the Format Changes from Format 1 to Format 2 Then Back to Format 1 4.16 Process Raw Wideband Data Containing Forward Time Jumps 4.17 Process Raw Wideband Data Containing Backward Time Jumps 4.18 Process Raw Wideband Data Containing a Forward Correction in the Spacecraft Clock
5/20/96 - 5/24/96	Interim turnover - build - confidence testing - regression testing 1.03 Manually Stop Data Receipt Function During Data Capture 4.10 Process Raw Wideband Data Containing Fewer Than 4 Errors in the Data Pointer Fields 4.11 Process Raw Wideband Data Containing More Than 3 Errors in the Data Pointer Fields 4.35 Receive and process an empty data file 7.06 Manually Terminate Current Data Processing
5/27/96	Holiday
5/28/96 - 5/31/96	1.09 Receive Nominal Data from LGS with Data Gaps 1.10 Receive Nominal Data from LGS with Interface Disconnects 1.12 Receive nominal raw wideband data with long contact period 4.12 Process Raw Wideband Data Containing Fewer Than 4 Bit Errors in the Minor Frame Data 4.13 Process Raw Wideband Data Containing More Than 3 Bit Errors in the Minor Frame Data 4.14 Process Raw Wideband Data Containing CADUs with Inverted Polarity Data 4.15 Process Raw Wideband Data Containing One CADU of partially Inverted Polarity Data
6/3/96 - 6/7/96	8mm tape to ECS 4.19 Process Raw Wideband Data Containing a Backward Correction in the Spacecraft Clock 4.20 Process Raw Wideband Data Containing Bit Errors in the Line Sync Code 4.23 Process Raw Wideband Data Containing Errors in the VCDU Version Number 4.25 Process Raw Wideband Data Containing Errors in the VCID (values of 0, 3, 4, and 6)

6/10/96 - 6/14/96	Interim turnover <ul style="list-style-type: none"> - build - confidence testing - regression testing 4.26 Process Raw Wideband Data Containing Errors in the VCDU Header Error Control Field 4.27 Process Raw Wideband Data Containing Errors in the CADU Sync Pattern
6/17/96 - 6/21/96	Regression testing <ul style="list-style-type: none"> 3.12 Process raw wideband data in which the VCDU counter rolls over 4.28 Process Raw Format 1 Wideband Data Containing Some VCID errors (looks like Format 2) 4.29 Process Raw Wideband Data Containing CADU Sync Patterns in the Mission Data 4.30 Process Raw Wideband Data Containing Line Sync Patterns in the Mission Data 4.32 Process Raw Wideband Data Containing Bit Errors in the End of Line Pattern
6/24/96 - 6/28/96	Regression testing <ul style="list-style-type: none"> 4.34 Process Raw Wideband Data Containing Fill VCDUs 4.36 Process raw wideband data containing bit errors in the VCDU counter S3.03 Process Data at 12 Mbps (Average Aggregate Rate)
7/26/96	Test Status Summary

Section 3 -- Test Procedures

3.0 Generic Test Procedure

Description

(Refer to the specific test case)

Requirements

(Refer to the specific test case)

Test Tools

(Refer to the specific test case)

Test Data

(Refer to the specific test case)

Success Criteria

(Refer to the specific test case)

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Step	Action	Response	Requirements
1	Use an Xterminal to open two windows on a LPS string.	Two Unix windows are displayed.	
2	Use the tail -f command to display messages written to the journal file in one of the windows.	Journal messages are displayed as they are added to the file.	3.1.10.3 3.1.10.4 3.1.12 3.1.19
3	Use the look-db script to view the LPS String Configuration.	The current configuration of the LPS string is displayed and is accurate.	
4	Modify the string configuration as necessary to receive data and commit the changes.	The new string configuration is correctly stored in the database.	3.1.11
5	Start the LPS by typing mac_lps.	LPS is initiated.	3.1.10.1

2. Initiate manual data receipt

Step	Action	Response	Requirements
1	Execute the rdc task using the -l, -b, and -e options to specify the channel id, the begin time, and the end time.	rdc is initiated and looks for data when the begin time is reached.	3.1.10.1 3.1.11 3.3.6.8 3.3.6.9a
2	Use the mzuser tool to initiate transfer of data to the LPS.	Data receipt begins.	3.3.1.1
3	Use the Unix cmp command to compare the received file to the input file.	The files are identical.	3.3.1.3 3.3.1.4
4	Use the sync dump and CADU dump tools to evaluate any discrepancies.		
5	Use the look-db script to review the statistics of the received data.	The received data statistics are obtained from the database and are correct.	3.3.6.2
6	Review the journal file.	The journal file contains messages with appropriate contents and severities.	

3. Initiate level OR processing

Step	Action	Response	Requirements
1	Use the look-db script to display the RDP parameters.	The RDP parameters are displayed.	
2	Use SQL commands to update RDP parameters as appropriate for the test.	The new values are validated and stored in the database.	
3	Use the look-db script to display the MFP parameters.	The MFP parameters are displayed.	
4	Use SQL commands to update MFP parameters as appropriate for the test.	All new values are validated and stored in the database.	
5	Use SQL commands to update message thresholds as appropriate for the test.	The new values are validated and stored in the DB.	
6	Monitor the available disk space for the output products by using the df -k Unix command.	Disk space is displayed for verification.	
7	Use mac_startl0r with correct contact sequence ID and file version number to start data processing. (Contact sequence ID and file version number can be retrieved from the process_id table.)	The contact period is selected and processed. The data processing is terminated automatically. The MSCD (Mirror Scan Correction Data) and DAN files are generated.	3.1.4 3.1.10.1 3.1.11 3.3.6.8 3.3.6.9b 4.1.6 4.3.3

8	Use the check-static-tables script to determine which database tables were updated as a result of the processing.	Only history and dynamic tables were updated.	
9	Use the look-db script to review the quality and accounting information of the Level 0R files.	The Level 0R quality and accounting information is obtained from the database and is correct.	3.1.6 3.1.10.5 3.3.2.1 3.3.2.2 3.3.2.3 3.3.2.4 3.3.2.5 3.3.2.6 3.3.2.7 3.3.2.9 3.3.2.9.1 3.3.2.11 3.3.2.12 3.3.2.13 3.3.2.14 3.3.2.15 3.3.2.23 3.3.2.26
10	Use the MSCD dump tool to create a dump the MSCD file. Compare the contents of the MSCD file to QA statistics from the database and scan line information from the input data.	The MSCD file contains the correct information.	3.3.2.20 3.3.2.25c
11	Analyze the DAN information by using the more command.	The DAN information is correct.	
12	Use gtdit to view any CADU trouble files that were generated as a result of the processing.	Appropriate CADUs were written to the trouble file.	3.3.2.8 3.3.2.10
13	Use gtdit to view any major frame trouble files that were generated as a result of the processing.	Appropriate major frames were written to the trouble file.	
14	Review the journal file.	The journal file contains messages with appropriate contents and severities.	3.1.10.3 3.1.10.4 3.1.12

3.1 Raw Wideband Data Receipt

3.1.1 Test Case 1.01 - Start Manual Data Receipt Per Operator Directive

Description

Verify the capability to manually control the data receipt operation.

Requirements

- 3.1.11 LPS shall provide the capability to control LPS operations.
- 3.3.6.8 LPS shall provide the capability to manually override the LPS automated functions.

Test Tools

SyncDump
CADU Dump
look-db
mzuser

Test Data

LPS.NORM.DATA_1
LPS.NORM.DATA_2

Success Criteria

The LPS successfully receives the operator directive and performs the data receipt operation.

Test Procedure

1. Initialize the LPS and setup LPS string(s).
Follow generic test procedure 1.
2. Initiate manual data receipt
Follow generic test procedure 2 for both Format 1 and 2 data sets.

3.1.2 Test Case 1.03 - Manually Stop Data Receipt Function During Data Capture

Description

Verify the capability to manually terminate the data receipt operation.

Requirements

- 3.1.10 The LPS shall provide an interactive intervention capability to detect and correct abnormal system conditions during LPS data capture and processing activities.
- 3.1.11 LPS shall provide the capability to control LPS operations.
- 3.3.6.8 LPS shall provide the capability to manually override the LPS automated functions.

Test Tools

SyncDump
CADU Dump
look-db
mzuser

Test Data

LPS.NORM.DATA_1
LPS.NORM.DATA_2

Success Criteria

The LPS allows the operator to successfully terminate the data receipt operation at any time after the operation starts.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Step	Action	Response	Requirements
1	Execute the rdc task using the -l, -b, and -e options to specify the channel id, the begin time, and the end time.	rdc is initiated and looks for data when the begin time is reached.	3.1.11 3.3.6.8
2	Use the mzuser tool to initiate transfer of data to the LPS.	Data receipt begins.	
3	Stop data capture by using the rdc_Terminate script to terminate the RDACS task or its child process	Data capture terminates.	3.1.10 3.1.11 3.3.6.8
4	Use the Unix cmp command to compare the received file to the input file.	The files are identical until the point when data capture stops.	
5	Use the sync dump and CADU dump tools to evaluate any discrepancies.		

6	Use the look-db script to review the statistics of the received data.	The received data statistics are obtained from the database and are correct.	
7	Review the journal file.	The journal file contains messages with appropriate contents and severities.	

3.1.3 Test Case 1.09 - Receive nominal data from LGS, transmission errors cause gaps in data flow

Description

Verify the capability to receive the wideband data from LGS with data gaps.

Requirements

3.3.1.12 LPS shall maintain return link wideband data receipt capability during contact period anomalies.

Test Tools

SyncDump
CADU Dump
look-db
mzuser

Test Data

LPS.NORM.DATA_1

Success Criteria

The LPS should be able to perform data receipt operation under the data gap condition.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Step	Action	Response	Requirements
1	Execute the rdc task using the -l, -b, and -e options to specify the channel id, the begin time, and the end time.	rdc is initiated and looks for data when the begin time is reached.	
2	Use the mzuser tool to initiate transfer of data to the LPS.	Data receipt begins.	
3	Periodically stop and restart the data flow for several seconds by using the Ctrl-z and fg commands.	Data continue to be received and stored until the specified stop time.	3.3.1.12
4	Use the Unix cmp command to compare the received file to the input file.	The files are identical.	
5	Use the sync dump and CADU dump tools to evaluate any discrepancies.		
6	Use the look-db script to review the statistics of the received data.	The received data statistics are obtained from the database and are correct.	

7	Review the journal file.	The journal file contains messages with appropriate contents and severities.	
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3.1.4 Test Case 1.10 - Receive nominal data from LGS, interface disconnects during transmission

Description

Verify the capability to maintain the data receipt feature during the interface disconnection scenario.

Requirements

- 3.3.1.1 LPS shall provide the capability to receive return link wideband data inputs from LGS on a Landsat 7 contact period basis.
- 3.3.1.12 LPS shall maintain return link wideband data receipt capability during contact period anomalies.

Test Tools

SyncDump
CADU Dump
look-db
mzuser

Test Data

LPS.NORM.DATA_1
LPS.NORM.DATA_2

Success Criteria

The LPS should continue the data receipt operation after the interface disconnection is recovered.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.
2. Initiate manual data receipt

Step	Action	Response	Requirements
1	Execute the rdc task using the -l, -b, and -e options to specify the channel id, the begin time, and the end time.	rdc is initiated and looks for data when the begin time is reached.	
2	Use the mzuser tool to initiate transfer of data to the LPS.	Data receipt begins.	3.3.1.1
3	Break the connection between the sending and receiving computers for a few seconds by disconnecting and reconnecting a cable.	After the cable is reconnected, data continue to be written to the original file.	3.3.1.12
4	Use the Unix cmp command to compare the received file to the input file.	The files are identical.	
5	Use the sync dump and CADU dump tools to evaluate any discrepancies.		

6	Use the look-db script to review the statistics of the received data.	The received data statistics are obtained from the database and are correct.	
7	Review the journal file.	The journal file contains messages with appropriate contents and severities.	

3.1.5 Test Case 1.12 - Receive nominal raw wideband data with long contact period

Description

Verify the capability to handle a specification for receipt of data which exceeds the maximum contact period.

Requirements

3.1.10.5 LPS shall provide the capability to recover from system faults.

Test Tools

SyncDump
CADU Dump
look-db
mzuser

Test Data

LPS.NORM.BIG_DATA_1
LPS.NORM.BIG_DATA_2

Success Criteria

The LPS receives the wideband data successfully until the limit for a maximum contact is exceeded. Data receipt terminates gracefully. Appropriate messages are generated to describe why data receipt terminated before the specified end time.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Step	Action	Response	Requirements
1	Execute the rdc task using the -l, -b, and -e options to specify the channel id, the begin time, and the end time. The time span specified should be long enough to receive more than 8 GB of data.	rdc is initiated and looks for data when the begin time is reached.	
2	Use the mzuser tool to initiate transfer of data to the LPS.	Data receipt begins.	
3	Continue to send data until data receipt terminates.	More data are received than are expected in the maximum contact period. The data capture process terminates gracefully.	3.1.10.5
4	Use the look-db script to review the statistics of the received data.	The received data statistics are obtained from the database and are correct.	

5	Review the journal file.	The journal file contains messages with appropriate contents and severities.	
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3.2 Raw Wideband Data Storage

3.2.1 Test Case 2.01 - Write nominal raw wideband data to disk, by output channel, by contact period

Description

Verify the capability to store the wideband data to the disk.

Requirements

3.3.1.3 LPS shall store return link wideband data on a Landsat 7 contact period basis.

3.3.1.4 LPS shall store return link wideband data on an LGS output channel basis.

Test Tools

SyncDump
CADU Dump
look-db
mzuser

Test Data

LPS.NORM.DATA_1

LPS.NORM.DATA_2

Success Criteria

The LPS successfully stores the raw wideband data on the disk after the data receipt operation is complete. The data integrity is maintained.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3.2.2 Test Case 2.06 - Write raw wideband data to disk with insufficient space to accommodate complete file

Description

Verify the capability to handle the insufficient disk space problem during the data storing operation.

Requirements

3.3.1.4 LPS shall store return link wideband data on an LGS output channel basis.

Test Tools

SyncDump
CADU Dump
look-db
fill_it
mzuser

Test Data

LPS.NORM.BIG_DATA_1
LPS.NORM.BIG_DATA_2

Success Criteria

Before the actual data store operation starts, the LPS generates the warning messages when the file size is greater than the available disk capacity. All the data prior to this limitation should be stored on the disk.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Fill the front-end RAID.

Step	Action	Response	Requirements
1	Use the fill_it tool to place enough data on the front-end RAID so that there is insufficient space remaining to store the data for this test.	The front-end RAID is nearly full.	

3. Initiate manual data receipt

Step	Action	Response	Requirements
1	Execute the rdc task using the -l, -b, and -e options to specify the channel id, the begin time, and the end time.	rdc is initiated and looks for data when the begin time is reached.	
2	Use the mzuser tool to initiate transfer of data to the LPS.	Data receipt begins. Data capture terminates gracefully when the input RAID runs out of space.	

3	Use the Unix cmp command to compare the received file to the input file.	The files are identical until the point where no more data could be stored.	3.3.1.4
4	Use the sync dump and CADU dump tools to evaluate any discrepancies.		
5	Use the look-db script to review the statistics of the received data.	The received data statistics are consistent with running out of space.	
6	Review the journal file.	The journal file contains messages with appropriate contents and severities.	

4. Remove temporary files.

Step	Action	Response	Requirements
1	Use the Unix rm command to remove temporary files from the front-end RAID.	Files are removed.	

3.3 Nominal Data Processing

3.3.1 Test Case 3.01 - Process a file of nominal raw wideband data

Description

Verify the capability to perform the level 0R data processing on a specific LPS contact period.

Requirements

- 3.1.4 LPS shall process wideband data inputs from LGS on a Landsat 7 contact period (return link wideband data recording session) basis.
- 3.1.6 LPS shall generate Landsat 7 return link quality and accounting data on a Landsat 7 contact period basis for each wideband data input.
- 3.1.19 LPS shall provide monitoring test points and indicators to verify proper operation of system capabilities and components.
- 3.3.2.1 LPS shall perform Consultative Committee for Space Data Systems (CCSDS) Advanced Orbiting Systems (AOS) Grade-3 service on all received wideband Channel Access Data Units (CADUs) formatted in accordance with recommendations contained in Applicable Document 1.
- 3.3.2.2 LPS shall perform CADU synchronization on all received wideband data.
- 3.3.2.7 LPS shall provide the capability to perform pseudo-random (PN) decoding of all received Virtual Channel Data Units (VCDUs) in accordance with the recommendations contained in Applicable Document 1.
- 3.3.2.13 LPS shall provide the capability to collect and store Landsat 7 return link (input) quality and accounting data, including the following information, for the wideband data received during each contact period:
 - a. LPS string ID
 - b. Contact period start and stop times.
 - c. CADU synchronization information (polarity, synchronization strategy and bit slips)
 - d. Count of CADUs with synchronization errors.
 - e. Count of received CADUs.
 - f. Count of missing CADUs flywheeled.
 - h. Count of correctable VCDU headers, by VCDU-ID (RS checked).
 - I. Count of uncorrectable VCDU headers (RS checked).
 - j. Count of CADUs with BCH errors corrected for the mission data zone in the VCDU.
 - k. Count of CADUs with BCH errors corrected for the data pointer zone in the VCDU.
 - l. Count of CADUs with BCH errors uncorrected for the mission zone in the VCDU.
 - m. Count of CADUs with BCH errors uncorrected for the data pointer zone in the VCDU.
 - n. Count of CADUs with Cyclic Redundancy Check (CRC) errors.
 - o. Approximate amount of wideband data received in megabytes.
 - p. Count of major frames received.
 - q. Approximate number of Enhanced Thematic Mapper Plus (ETM+) scenes received.
 - r. Approximate Bit Error Rate (BER) based on BCH detected and/or CRC bit errors.
- 3.3.2.14 LPS shall locate ETM+ minor frames in each received VCDU as specified in Applicable Document 3.
- 3.3.2.15 LPS shall perform ETM+ major frame synchronization using ETM+ minor frames as specified in Applicable Document 3.
- 3.3.2.20 LPS shall provide the capability to extract Mirror Scan Correction Data (MSCD) on an ETM+ major frame basis.
- 3.3.2.23 LPS shall provide the capability to determine ETM+ data subintervals.
- 3.3.2.25 LPS shall provide the capability to generate the following correlated Level 0R files(s) on a received sub-interval basis:
 - *a. ETM+ Image data
 - *b. Payload Correction Data (PCD)
 - c. Mirror Scan Correction Data (MSCD)
 - *d. Calibration/DC Restore Data
- 3.3.2.26 LPS shall generate Level 0R quality and accounting data, including the following information, on a sub-interval basis:
 - a. Sub-interval start and stop times.

- b. Count of major frames in sub-interval.
 - c. CADU synchronization information (polarity, synchronization strategy and bit slips)
 - d. Count of CADUs with synchronization errors.
 - e. Count of received CADUs.
 - f. Count of missing CADUs flywheeled.
 - h. Count of correctable VCDU headers, by VCDU-ID (RS checked).
 - I. Count of uncorrectable VCDU headers (RS checked).
 - j. Count of CADUs with BCH errors corrected for the mission data zone in the VCDU.
 - k. Count of CADUs with BCH errors corrected for the data pointer zone in the VCDU.
 - l. Count of CADUs with BCH errors uncorrected for the mission zone in the VCDU.
 - m. Count of CADUs with BCH errors uncorrected for the data pointer zone in the VCDU.
 - n. Count of CADUs with CRC errors.
 - o. Count of entirely filled ETM+ major frames
 - p. Count of partially filled ETM+ major frames
 - q. BER (based on BCH and/or CRC detected bit errors)
 - r. Imagery timecode errors
- 3.3.6.2 LPS shall provide the capability to collect and report Landsat 7 return link quality and accounting data for each wideband data input on a Landsat 7 contact period basis.

* Requirement 3.3.2.25 items a, b, and d are not supported in Build 1.

Test Tools

SyncDump
 CADU Dump
 look-db
 mzuser
 MSCD file dump tool
 check-static-tables
 gtedit

Test Data

LPS.NORM.DATA_1
 LPS.NORM.DATA_2

Success Criteria

The LPS successfully processes the received wideband data and generates the MSCD and DAN files. No errors are received.

Test Procedure

Note: This procedure is identical to the procedure for test case 7.10. Both tests should be executed concurrently.

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.3.2 Test Case 3.07 - Process raw wideband data containing a forward time jump across a year boundary

Description

Verify the capability to perform level 0R data processing with data containing a forward time jump across a year boundary.

Requirements

3.3.2.23 LPS shall provide the capability to determine ETM+ data subintervals.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.TC3.07.DAT

Success Criteria

The LPS successfully processes the received wideband data and generates the MSCD and DAN files. A new subinterval is started after the jump. The correct year is assigned to each subinterval. No errors are received.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.3.3 Test Case 3.09 - Process raw wideband data that crosses the boundary from day 365 to day 366

Description

Verify the capability to perform the LEVEL 0R data processing with data that crosses the boundary from day 365 to day 366.

Requirements

3.3.2.23 LPS shall provide the capability to determine ETM+ data subintervals.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.TC3.09.DAT

Success Criteria

The LPS successfully processes the received wideband data and generates the MSCD and DAN files. The data containing day 366 are assigned a day/year of 001/1996. A new subinterval is not started due to the year change. No errors are received.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.3.4 Test Case 3.12 - Process raw wideband data in which the VCDU counter rolls over

Description

Verify the capability to perform the LEVEL 0R data processing with data in which the VCDU counter rolls over.

Requirements

3.3.2.23 LPS shall provide the capability to determine ETM+ data subintervals.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.TC3.12.DAT

Success Criteria

The LPS correctly processes the received wideband data and generates the MSCD and DAN files. The VCDU counter rollover does not impact processing of the data. No errors are received.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.3.5 Test Case 3.13 - Process raw wideband data in which the format changes from Format 1 to Format 2

Description

Verify the capability to perform the LEVEL 0R data processing under the condition that format changes in the data (Format 1 to Format 2).

Requirements

- 3.3.2.11 LPS shall start a new sub-interval on detection of a change in the VCID
- 3.3.2.23 LPS shall provide the capability to determine ETM+ data subintervals.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.NORM.DATA_1_2

Success Criteria

The LPS successfully starts a new sub-interval for the VCID change, processes the received wideband data and generates two MSCD files (one per sub-interval) and one DAN file.
No errors are received.

Test Procedure

1. Initialize the LPS and setup LPS string(s).
Follow generic test procedure 1.
2. Initiate manual data receipt
Follow generic test procedure 2.
3. Initiate level 0R processing
Follow generic test procedure 3.

3.3.6 Test Case 3.14 - Process raw wideband data in which the format changes from Format 2 to Format 1

Description

Verify the capability to perform the LEVEL 0R data processing under the condition that format changes in the data (Format 2 to Format 1).

Requirements

- 3.3.2.11 LPS shall start a new sub-interval on detection of a change in the VCID
- 3.3.2.23 LPS shall provide the capability to determine ETM+ data subintervals.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.NORM.DATA_2_1

Success Criteria

The LPS successfully starts a new sub-interval for the VCID change, processes the received wideband data and generates two MSCD files (one per sub-interval) and one DAN file.
No errors are received.

Test Procedure

1. Initialize the LPS and setup LPS string(s).
Follow generic test procedure 1.
2. Initiate manual data receipt
Follow generic test procedure 2.
3. Initiate level 0R processing
Follow generic test procedure 3.

3.3.7 Test Case 3.15 - Process raw wideband data in which the format changes from Format 1 to Format 2 then back to Format 1

Description

Verify the capability to perform the LEVEL 0R data processing under the condition that format changes in the data.

Requirements

- 3.3.2.11 LPS shall start a new sub-interval on detection of a change in the VCID
- 3.3.2.23 LPS shall provide the capability to determine ETM+ data subintervals.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.NORM.DATA_1_2_1

Success Criteria

The LPS successfully starts a new sub-interval for each VCID change, processes the received wideband data and generates three MSCD files (one per sub-interval) and one DAN file.
No errors are received.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.4 Anomalous Data Processing

3.4.1 Test Case 4.10 - Process raw wideband data containing fewer than 4 errors in some of the data pointer fields

Description

Verify the capability to correct the wideband data with limited errors in the data pointer fields.

Requirements

- 3.1.10.3 LPS shall provide the capability to generate and report LPS error messages.
- 3.1.10.4 LPS shall provide the capability to isolate system faults.
- 3.1.10.5 LPS shall provide the capability to recover from system faults.
- 3.3.2.4 LPS shall utilize a Search/Check/Lock/Flywheel strategy for synchronization using the following selectable tolerances:
 - a. Search tolerance of between 1 and 3 CADUs
 - b. Check tolerance of between 0 and 3 CADUs
 - c. (deleted)
 - d. Flywheel tolerance of between 0 and 3 CADUs
 - e. CADU synchronization marker Check error tolerance of between 0 and 3 bits
 - f. CADU synchronization marker Lock error tolerance of between 0 and 3 bits
- 3.3.2.6 LPS shall provide the capability to recover from bit slips, selectable between 0 and plus or minus 3 bits, in a CADU, by truncating or padding to the proper length.
- 3.3.2.9.1 LPS shall provide the capability to perform BCH error detection and correction on the data pointer zone contained in the VCDU (CCSDS processed data) in accordance with the Landsat 7 spacecraft data format information contained in Applicable Document 3.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.TC.4.10.DAT

Success Criteria

The LPS detects and corrects the given errors in the data and generates the MSCD and DAN files.
(Note: All CADUs that fail CRC will be placed in the trouble file.)

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.4.2 Test Case 4.11 - Process raw wideband data containing more than 3 errors in some of the data pointer fields

Description

Verify the capability to handle the wideband data which have uncorrectable errors in the data pointer fields.

Requirements

- 3.1.10.3 LPS shall provide the capability to generate and report LPS error messages.
- 3.1.10.4 LPS shall provide the capability to isolate system faults.
- 3.1.10.5 LPS shall provide the capability to recover from system faults.
- 3.3.2.4 LPS shall utilize a Search/Check/Lock/Flywheel strategy for synchronization using the following selectable tolerances:
 - a. Search tolerance of between 1 and 3 CADUs
 - b. Check tolerance of between 0 and 3 CADUs
 - c. (deleted)
 - d. Flywheel tolerance of between 0 and 3 CADUs
 - e. CADU synchronization marker Check error tolerance of between 0 and 3 bits
 - f. CADU synchronization marker Lock error tolerance of between 0 and 3 bits
- 3.3.2.6 LPS shall provide the capability to recover from bit slips, selectable between 0 and plus or minus 3 bits, in a CADU, by truncating or padding to the proper length.
- 3.3.2.8 LPS shall provide the capability to store all CADUs which have failed CCSDS Grade-3 service processing, on a Landsat 7 contact period basis.
- 3.3.2.9.1 LPS shall provide the capability to perform BCH error detection and correction on the data pointer zone contained in the VCDU (CCSDS processed data) in accordance with the Landsat 7 spacecraft data format information contained in Applicable Document 3.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.TC.4.11.DAT

Success Criteria

The LPS places all CADUs with uncorrectable errors in a trouble file. The remaining data are processed correctly.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.4.3 Test Case 4.12 - Process raw wideband data containing correctable bit errors in some of the minor frame data

Description

Verify the capability to correct the wideband data with limited bit errors in the minor frames.

Requirements

- 3.1.10.3 LPS shall provide the capability to generate and report LPS error messages.
- 3.1.10.4 LPS shall provide the capability to isolate system faults.
- 3.1.10.5 LPS shall provide the capability to recover from system faults.
- 3.3.2.6 LPS shall provide the capability to recover from bit slips, selectable between 0 and plus or minus 3 bits, in a CADU, by truncating or padding to the proper length.
- 3.3.2.9 LPS shall provide the capability to perform Bose-Chaudhuri-Hocquenghem (BCH) error detection and correction on the mission data zone contained in the VCDU (CCSDS processed data) in accordance with the Landsat 7 spacecraft data format information contained in Applicable Document 3.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.TC.4.12.DAT

Success Criteria

The LPS detects and corrects the given bit errors in the data and generate the MSCD and DAN files.
(Note: All CADUs that fail CRC will be placed in the trouble file.)

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.4.4 Test Case 4.13 - Process raw wideband data containing uncorrectable bit errors in some of the minor frame data

Description

Verify the capability to handle the wideband data which have uncorrectable bit errors in the minor frames.

Requirements

- 3.1.10.3 LPS shall provide the capability to generate and report LPS error messages.
- 3.1.10.4 LPS shall provide the capability to isolate system faults.
- 3.1.10.5 LPS shall provide the capability to recover from system faults.
- 3.3.2.6 LPS shall provide the capability to recover from bit slips, selectable between 0 and plus or minus 3 bits, in a CADU, by truncating or padding to the proper length.
- 3.3.2.8 LPS shall provide the capability to store all CADUs which have failed CCSDS Grade-3 service processing, on a Landsat 7 contact period basis.
- 3.3.2.9 LPS shall provide the capability to perform Bose-Chaudhuri-Hocquenghem (BCH) error detection and correction on the mission data zone contained in the VCDU (CCSDS processed data) in accordance with the Landsat 7 spacecraft data format information contained in Applicable Document 3.
- 3.3.2.10 LPS shall provide the capability to store all CADUs which have failed BCH error detection and correction on the mission data zone, on a Landsat 7 contact period basis.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.TC.4.13.DAT

Success Criteria

The LPS places all CADUs with uncorrectable errors in a trouble file. The remaining data are processed correctly.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.4.5 Test Case 4.14 - Process raw wideband data containing CADUs with inverted polarity data

Description

Verify the capability to correct the wideband data with CADUs having inverted polarity data.

Requirements

- 3.1.10.3 LPS shall provide the capability to generate and report LPS error messages.
- 3.1.10.4 LPS shall provide the capability to isolate system faults.
- 3.1.10.5 LPS shall provide the capability to recover from system faults.
- 3.3.2.3 LPS shall provide the capability to detect and to synchronize on both normal and inverted polarity wideband data concurrently.
- 3.3.2.5 LPS shall invert all bits of each CADU detected to have inverted polarity.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.TC.4.14.DAT

Success Criteria

The LPS detects and inverts all bits of each problem CADU, and generates the MSCD and DAN files.
(Note: All CADUs that fail CRC will be placed in the trouble file.)

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.4.6 Test Case 4.15 - Process raw wideband data containing one CADU of partially inverted polarity data

Description

Verify the capability to handle the wideband data with lots of CADUs having inverted polarity data (see previous test case), plus one CADU containing partially inverted polarity data.

Requirements

- 3.1.10.3 LPS shall provide the capability to generate and report LPS error messages.
- 3.1.10.4 LPS shall provide the capability to isolate system faults.
- 3.1.10.5 LPS shall provide the capability to recover from system faults.
- 3.3.2.3 LPS shall provide the capability to detect and to synchronize on both normal and inverted polarity wideband data concurrently.
- 3.3.2.5 LPS shall invert all bits of each CADU detected to have inverted polarity.
- 3.3.2.8 LPS shall provide the capability to store all CADUs which have failed CCSDS Grade-3 service processing on a Landsat 7 contact period basis.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.TC.4.15.DAT

Success Criteria

The LPS detects and flips all bits of some CADUs in which the frame sync is inverted, and generates the MSCD and DAN files. Partially inverted CADUs in which the frame sync is not flipped are placed in the trouble file.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.4.7 Test Case 4.16 - Process raw wideband data containing large forward time jumps

Description

Verify the capability to handle the wideband data with large forward time jumps.

Requirements

3.3.2.23 LPS shall provide the capability to determine ETM+ data subintervals.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdedit

Test Data

LPS.TC.4.16.DAT

Success Criteria

If the time jump exceeds the tolerance, the LPS starts a new sub-interval, processes the received wideband data and generates two MSCD files (one per sub-interval) and DAN files.

If the time jump is within the tolerance, the LPS just processes the received wideband data and generates the MSCD and DAN files.

No errors are received from either of above cases.

(Note: All CADUs that fail CRC will be placed in the trouble file.)

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.4.8 Test Case 4.17 - Process raw wideband data containing large backward time jumps

Description

Verify the capability to handle the wideband data with large backward time jumps.

Requirements

3.3.2.23 LPS shall provide the capability to determine ETM+ data subintervals.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdedit

Test Data

LPS.TC.4.17.DAT

Success Criteria

If the time jump exceeds the tolerance, the LPS starts a new sub-interval, processes the received wideband data and generates two MSCD files (one per sub-interval) and DAN files.

If the time jump is within the tolerance, the LPS just processes the received wideband data and generates the MSCD and DAN files.

No errors are received from either of above cases.

(Note: All CADUs that fail CRC will be placed in the trouble file.)

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.4.9 Test Case 4.18 - Process raw wideband data containing small forward time jumps

Description

Verify the capability to handle the wideband data with small forward time jumps.

Requirements

- 3.1.10.3 LPS shall provide the capability to generate and report LPS error messages.
- 3.1.10.4 LPS shall provide the capability to isolate system faults.
- 3.1.10.5 LPS shall provide the capability to recover from system faults.
- 3.3.2.23 LPS shall provide the capability to determine ETM+ data subintervals.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.TC.4.18.DAT

Success Criteria

If the spacecraft clock correction exceeds the tolerance, the LPS starts a new sub-interval, processes the received wideband data and generates two MSCD (one per sub-interval) and DAN files.

If the clock correction is within the tolerance, the LPS just processes the received wideband data and generates the MSCD and DAN files.

No errors are received from either of above cases.

(Note: All CADUs that fail CRC will be placed in the trouble file.)

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

Repeat step 3 several times using different tolerances for starting a subinterval.

3.4.10 Test Case 4.19 - Process raw wideband data containing small backward time jumps

Description

Verify the capability to handle the wideband data with small backward time jumps.

Requirements

- 3.1.10.3 LPS shall provide the capability to generate and report LPS error messages.
- 3.1.10.4 LPS shall provide the capability to isolate system faults.
- 3.1.10.5 LPS shall provide the capability to recover from system faults.
- 3.3.2.23 LPS shall provide the capability to determine ETM+ data subintervals.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.TC.4.19.DAT

Success Criteria

If the spacecraft clock correction exceeds the tolerance, the LPS starts a new sub-interval, processes the received wideband data and generates two MSCD (one per sub-interval) and DAN files.

If the clock correction is within the tolerance, the LPS just processes the received wideband data and generates the MSCD and DAN files.

No errors are received from either of above cases.

(Note: All CADUs that fail CRC will be placed in the trouble file.)

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

Repeat step 3 several times using different tolerances for starting a subinterval.

3.4.11 Test Case 4.20 - Process raw wideband data containing bit errors in the line sync code

Description

Verify the capability to handle wideband data with bit errors in the line sync code.

Requirements

- 3.1.10.3 LPS shall provide the capability to generate and report LPS error messages.
- 3.1.10.4 LPS shall provide the capability to isolate system faults.
- 3.1.10.5 LPS shall provide the capability to recover from system faults.
- 3.3.2.15 LPS shall perform ETM+ major frame synchronization using ETM+ minor frames as specified in Applicable Document 3.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.TC.4.20.DAT

Success Criteria

The LPS detects and corrects up to 3 bit errors in the line sync code for each scan, and generates the MSCD and DAN files. The scans containing more than 3 errors in the line sync code are placed in a trouble file.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.4.12 Test Case 4.23 - Process raw wideband data containing errors in the VCDU version number

Description

Verify the capability to correct wideband data with errors in the VCDU version number.

Requirements

- 3.1.10.3 LPS shall provide the capability to generate and report LPS error messages.
- 3.1.10.4 LPS shall provide the capability to isolate system faults.
- 3.1.10.5 LPS shall provide the capability to recover from system faults.
- 3.3.2.1 LPS shall perform Consultative Committee for Space Data Systems (CCSDS) Advanced Orbiting Systems (AOS) Grade-3 service on all received wideband Channel Access Data Units (CADUs) formatted in accordance with recommendations contained in Applicable Document 1.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.TC.4.23.DAT

Success Criteria

The LPS detects and corrects all errors in the VCDU version number, and generates the MSCD and DAN files. (Note: All CADUs that fail CRC will be placed in the trouble file.)

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.4.13 Test Case 4.25 - Process raw wideband data containing errors in the VCID (values of 0, 3, 4, and 6)

Description

Verify the capability to correct wideband data with errors in some of the VCID fields.

Requirements

- 3.1.10.3 LPS shall provide the capability to generate and report LPS error messages.
- 3.1.10.4 LPS shall provide the capability to isolate system faults.
- 3.1.10.5 LPS shall provide the capability to recover from system faults.
- 3.3.2.1 LPS shall perform Consultative Committee for Space Data Systems (CCSDS) Advanced Orbiting Systems (AOS) Grade-3 service on all received wideband Channel Access Data Units (CADUs) formatted in accordance with recommendations contained in Applicable Document 1.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.TC.4.25.DAT

Success Criteria

The LPS detects and corrects all errors in the VCID field, and generates the MSCD and DAN files.
(Note: All CADUs that fail CRC will be placed in the trouble file.)

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.4.14 Test Case 4.26 - Process raw wideband data containing errors in the VCDU Header Error Control field

Description

Verify the capability to handle wideband data with errors in the VCDU header error control field.

Requirements

- 3.1.10.3 LPS shall provide the capability to generate and report LPS error messages.
- 3.1.10.4 LPS shall provide the capability to isolate system faults.
- 3.1.10.5 LPS shall provide the capability to recover from system faults.
- 3.3.2.1 LPS shall perform Consultative Committee for Space Data Systems (CCSDS) Advanced Orbiting Systems (AOS) Grade-3 service on all received wideband Channel Access Data Units (CADUs) formatted in accordance with recommendations contained in Applicable Document 1.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.TC.4.26.DAT

Success Criteria

The LPS detects the bit errors in the VCDU header error control field, and generates the MSCD and DAN files. All CADUs containing bit errors in the VCDU header error control field are placed in a trouble file.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.4.15 Test Case 4.27 - Process raw wideband data containing errors in the CADU sync pattern

Description

Verify the capability to handle wideband data with errors in the CADU sync pattern.

Requirements

- 3.1.10.3 LPS shall provide the capability to generate and report LPS error messages.
- 3.1.10.4 LPS shall provide the capability to isolate system faults.
- 3.1.10.5 LPS shall provide the capability to recover from system faults.
- 3.3.2.2 LPS shall perform CADU synchronization on all received wideband data.
- 3.3.2.4 LPS shall utilize a Search/Check/Lock/Flywheel strategy for synchronization using the following selectable tolerances:
 - a. Search tolerance of between 1 and 3 CADUs
 - b. Check tolerance of between 0 and 3 CADUs
 - c. (deleted)
 - d. Flywheel tolerance of between 0 and 3 CADUs
 - e. CADU synchronization marker Check error tolerance of between 0 and 3 bits
 - f. CADU synchronization marker Lock error tolerance of between 0 and 3 bits

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.TC.4.27.DAT

Success Criteria

The LPS detects (if the errors is within the system tolerance) the errors in the CADU sync pattern, and generates the MSCD and DAN files. All CADUs containing more than 3 errors in the CADU sync pattern are placed in a trouble file.

The Search/Check/Lock/Flywheel tolerances are used correctly.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.4.16 Test Case 4.28 - Process raw Format 1 wideband data containing some VCID errors (looks like Format 2)

Description

Verify the capability to correct Format 1 wideband data with some VCID errors.(looks like Format 2)

Requirements

- 3.1.10.3 LPS shall provide the capability to generate and report LPS error messages.
- 3.1.10.4 LPS shall provide the capability to isolate system faults.
- 3.1.10.5 LPS shall provide the capability to recover from system faults.
- 3.3.2.1 LPS shall perform Consultative Committee for Space Data Systems (CCSDS) Advanced Orbiting Systems (AOS) Grade-3 service on all received wideband Channel Access Data Units (CADUs) formatted in accordance with recommendations contained in Applicable Document 1.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.TC.4.28.DAT

Success Criteria

The LPS detects and corrects the VCID errors.
MSCD and DAN files are generated.
A new subinterval is not started when the error VCID is received.
(Note: All CADUs that fail CRC will be placed in the trouble file.)

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.4.17 Test Case 4.29 - Process raw wideband data containing CADU sync patterns in the Mission data

Description

Verify the capability to process wideband data with CADU sync patterns in the Mission data zone.

Requirements

- 3.3.2.2 LPS shall perform CADU synchronization on all received wideband data.
- 3.3.2.4 LPS shall utilize a Search/Check/Lock/Flywheel strategy for synchronization using the following selectable tolerances:
 - a. Search tolerance of between 1 and 3 CADUs
 - b. Check tolerance of between 0 and 3 CADUs
 - c. (deleted)
 - d. Flywheel tolerance of between 0 and 3 CADUs
 - e. CADU synchronization marker Check error tolerance of between 0 and 3 bits
 - f. CADU synchronization marker Lock error tolerance of between 0 and 3 bits
- 3.3.2.15 LPS shall perform ETM+ major frame synchronization using ETM+ minor frames as specified in Applicable Document 3.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.TC.4.29.DAT

Success Criteria

The LPS successfully performs frame synchronization, ignoring CADU sync patterns in the Mission data zone, and generates the MSCD and DAN files.
(Note: All CADUs that fail CRC will be placed in the trouble file.)

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.4.18 Test Case 4.30 - Process raw wideband data containing line sync patterns in the Mission data

Description

Verify the capability to process wideband data with line sync patterns in the mission data zone.

Requirements

- 3.3.2.15 LPS shall perform ETM+ major frame synchronization using ETM+ minor frames as specified in Applicable Document 3.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.TC.4.30.DAT

Success Criteria

The LPS maintains major frame synchronization through the image data containing the line sync pattern, and generates the MSCD and DAN files.
(Note: All CADUs that fail CRC will be placed in the trouble file.)

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.4.19 Test Case 4.32 - Process raw wideband data containing bit errors in the End of Line pattern code

Description

Verify the capability to handle wideband data with bit errors in the end of line pattern code.

Requirements

- 3.1.10.3 LPS shall provide the capability to generate and report LPS error messages.
- 3.1.10.4 LPS shall provide the capability to isolate system faults.
- 3.1.10.5 LPS shall provide the capability to recover from system faults.
- 3.3.2.15 LPS shall perform ETM+ major frame synchronization using ETM+ minor frames as specified in Applicable Document 3.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.TC.4.32.DAT

Success Criteria

The LPS detects and corrects CADUs with up to 3 bit errors in the end of line pattern code, and generates the MSCD and DAN files. The CADUs with more than 3 bit errors are placed in a trouble file, as a result. the entire major frame is placed in a trouble file. However, the LPS performs major frame synchronization successfully for the very next major frame data.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.4.20 Test Case 4.34 - Process raw wideband data containing fill VCDUs

Description

Verify the capability to handle wideband data with fill VCDUs.

Requirements

- 3.1.10.3 LPS shall provide the capability to generate and report LPS error messages.
- 3.1.10.4 LPS shall provide the capability to isolate system faults.
- 3.1.10.5 LPS shall provide the capability to recover from system faults.
- 3.3.2.12 LPS shall provide the capability to delete fill VCDUs.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.TC.4.34.DAT

Success Criteria

The LPS detects and deletes the fill VCDUs, and generates the MSCD and DAN files for the rest of the data.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.4.21 Test Case 4.35 - Receive and process an empty data file

Description

Verify the capability to handle the empty data receipt and processing operation.

Requirements

3.1.10.5 LPS shall provide the capability to recover from system faults.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.NORM.DATA_1

Success Criteria

The LPS creates an empty data file after the contact period expires with no data. Attempts to process an empty data file do not impact processing of future data.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Step	Action	Response	Requirements
1	Execute the rdc task using the -l, -b, and -e options to specify the channel id, the begin time, and the end time.	rdc is initiated and looks for data when the begin time is reached.	
2	Do not initiate transfer of data to the LPS.	A file is opened to receive the data. At the scheduled stop time, data receipt terminates and an empty file is produced.	
3	Use the Unix ls -l command to verify the size of the file.	The file is empty.	
4	Use the look-db script to review the data receipt statistics.	The received data statistics are consistent with receipt of no data.	3.1.10.5
5	Review the journal file.	The journal file contains messages with appropriate contents and severities.	

3. Initiate level OR processing

Step	Action	Response	Requirements
1	Use the look-db script to display the RDP parameters.	The RDP parameters are displayed.	
2	Use SQL commands to update RDP parameters as appropriate for the test.	The new values are validated and stored in the database.	
3	Use the look-db script to display the MFP parameters.	The MFP parameters are displayed.	
4	Use SQL commands to update MFP parameters as appropriate for the test.	All new values are validated and stored in the database.	
5	Use SQL commands to update message thresholds as appropriate for the test.	The new values are validated and stored in the DB.	
6	Monitor the available disk space for the output products by using the df -k Unix command.	Disk space is displayed for verification.	
7	Use mac_startl0r with correct contact sequence ID and file version number to start data processing. (Contact sequence ID and file version number can be retrieved from the process_id table.)	The contact period is selected and no processing is performed on the empty file.	
8	Use the check-static-tables script to determine which database tables were updated as a result of the processing.	No tables were updated.	3.1.10.5
9	Review the journal file.	The journal file contains messages with appropriate contents and severities.	

4. Initiate manual data receipt for a nominal data set.

Follow generic test procedure 2.

5. Initiate level OR processing for a nominal data set.

Follow generic test procedure 3.

3.4.22 Test Case 4.36 - Process raw wideband data containing bit errors in the VCDU counter

Description

Verify the capability to handle wideband data with bit errors in the VCDU counter.

Requirements

- 3.3.2.1 LPS shall perform Consultative Committee for Space Data Systems (CCSDS) Advanced Orbiting Systems (AOS) Grade-3 service on all received wideband Channel Access Data Units (CADUs) formatted in accordance with recommendations contained in Applicable Document 1.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.TC.4.36.DAT

Success Criteria

The LPS detects the errors in the VCDU counter, places all CADUs with problem VCDU counter in a trouble file (it is not protected by Reed-Solomon error check), and generates the MSCD and DAN files for the rest of the data.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.5 System Monitoring and Control

3.5.1 Test Case 7.01 - Monitor LPS System Initialization

Description

Verify the capability to monitor and control the LPS system initialization.

Requirements

3.1.12 LPS shall provide the capability to monitor LPS operations.

Test Tools

look-db

Test Data

N/A

Success Criteria

The LPS provides the capability to monitor and control the LPS initialization and display all associated messages.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

3.5.2 Test Case 7.02 - Startup the LPS interface for each operational string

Description

Verify the capability to start up LPS interface per each string.

Requirements

- 3.1.10.1 LPS shall provide a system start-up capability.
- 3.1.11 LPS shall provide the capability to control LPS operations.

Test Tools

look-db

Test Data

N/A

Success Criteria

The LPS provides the start up capability and generates appropriate messages.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

3.5.3 Test Case 7.04 - Manually start data processing of nominal data

Description

Verify the capability to manually initiate level 0R processing for nominal data.

Requirements

- 3.1.11 LPS shall provide the capability to control LPS operations.
- 3.3.6.8 LPS shall provide the capability to manually override the LPS automated functions.
- 3.3.6.9 LPS shall provide the capability to selectively enable and/or disable each of the following functions:
 - a. Receive Wideband Data
 - b. Generate Level 0R Files
 - *c. Transfer LPS Files

* Requirement 3.3.6.9c is not supported in Build 1.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.NORM.DATA_1
LPS.NORM.DATA_2

Success Criteria

Level 0R processing is successfully started and runs to completion.
MSCD and DAN files are created.
No errors are received.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.5.4 Test Case 7.06 - Manually terminate current data processing

Description

Verify the capability to manually terminate the current data processing.

Requirements

- 3.1.11 LPS shall provide the capability to control LPS operations.
- 3.3.6.8 LPS shall provide the capability to manually override the LPS automated functions.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.NORM.DATA_1

Success Criteria

The LPS provides the capability to manually stop data processing with no errors. No MSCD or DAN files are created.

Test Procedure

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Step	Action	Response	Requirements
1	Use the look-db script to display the RDP parameters.	The RDP parameters are displayed.	
2	Use SQL commands to update RDP parameters as appropriate for the test.	The new values are validated and stored in the database.	
3	Use the look-db script to display the MFP parameters.	The MFP parameters are displayed.	
4	Use SQL commands to update MFP parameters as appropriate for the test.	All new values are validated and stored in the database.	
5	Use SQL commands to update message thresholds as appropriate for the test.	The new values are validated and stored in the DB.	

6	Monitor the available disk space for the output products by using the df -k Unix command.	Disk space is displayed for verification.	
7	Use mac_startl0r with correct contact sequence ID and file version number to start data processing. (Contact sequence ID and file version number can be retrieved from the process_id table.)	The contact period is selected and processed.	3.1.11 3.3.6.8
8	After approximately half of the data has been processed, use mac_stopl0r <process ID> to stop processing the data.	Data processing stops.	3.1.11 3.3.6.8
9	Use the check-static-tables script to determine which database tables were updated as a result of the processing.	Only history and dynamic tables were updated.	
10	Use the look-db script to review the quality and accounting information of the Level 0R files.	The Level 0R quality and accounting information is obtained from the database and is correct.	
11	Use gtdit to view any CADU trouble files that were generated as a result of the processing.	Appropriate CADUs were written to the trouble file.	
12	Use gtdit to view any major frame trouble files that were generated as a result of the processing.	Appropriate major frames were written to the trouble file.	
13	Review the journal file.	The journal file contains messages with appropriate contents and severities.	

3.5.5 Test Case 7.10 - Monitor nominal wideband data processing

Description

Verify the capability to monitor the entire nominal wideband data processing.

Requirements

3.1.12 LPS shall provide the capability to monitor LPS operations.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.NORM.DATA_1
LPS.NORM.DATA_2

Success Criteria

The LPS provides the capability to monitor the data processing operation and displays all associated messages.

Test Procedure

Note: This procedure is identical to the procedure for test case 3.01. Both tests should be executed concurrently.

1. Initialize the LPS and setup LPS string(s).

Follow generic test procedure 1.

2. Initiate manual data receipt

Follow generic test procedure 2.

3. Initiate level 0R processing

Follow generic test procedure 3.

3.6 System Integration Test

3.6.1 Test Case S3.03 - Process data at 12 Mbps (average aggregate rate for 4 strings)

Description

Verify the capability to process wideband data at the specific rate.

Requirements

- 4.1.6 LPS shall provide the capability to process received wideband data at an average aggregate rate of 12 megabits per second (Mbps) (Includes 10% of overhead due to reprocessing).
- 4.3.3 LPS shall provide the capability to retrieve stored wideband data at rates equal to or greater than 7.5 Mbps for each LPS input.

Test Tools

SyncDump
CADU Dump
look-db
mzuser
MSCD file dump tool
check-static-tables
gtdit

Test Data

LPS.NORM.BIG.DATA_1
LPS.NORM.BIG.DATA_2

Success Criteria

The LPS processes the wideband data (both Format 1 and Format 2) at a rate greater than 3 Mbps per string.
MSCD and DAN files are created.
No errors are received.

Test Procedure

1. Initialize the LPS and setup LPS string(s).
Follow generic test procedure 1.
2. Initiate manual data receipt
Follow generic test procedure 2.
3. Initiate level 0R processing
Follow generic test procedure 3.
4. Calculate processing rate.

Appendix A

Mapping Build 1 Functional (F&PS) Requirements to Build 1 System Test Cases

F&PS Req. Number	Planned Implementation	Planned Verification (Test Cases)
3.1.4	Partial	3.01
3.1.6	Partial	3.01
3.1.10	Full	1.03
3.1.10.1	Full	7.02
3.1.10.3	Full	4.10, 4.11, 4.12, 4.13, 4.14, 4.15, 4.18, 4.19, 4.20, 4.23, 4.25, 4.26, 4.27, 4.28, 4.32, 4.34
3.1.10.4	Full	4.10, 4.11, 4.12, 4.13, 4.14, 4.15, 4.18, 4.19, 4.20, 4.23, 4.25, 4.26, 4.27, 4.28, 4.32, 4.34
3.1.10.5	Full	1.12, 4.10, 4.11, 4.12, 4.13, 4.14, 4.15, 4.18, 4.19, 4.20, 4.23, 4.25, 4.26, 4.27, 4.28, 4.32, 4.34, 4.35
3.1.11	Full	1.01, 1.03, 7.02, 7.04, 7.06
3.1.12	Full	7.01, 7.10
3.1.19	Full	3.01
3.3.1.1	Full	1.02, 1.10
3.3.1.3	Full	2.01
3.3.1.4	Full	2.01, 2.06
3.3.1.12	Full	1.09, 1.10
3.3.2.1	Full	3.01, 4.23, 4.25, 4.26, 4.28, 4.36
3.3.2.2	Full	3.01, 4.27, 4.29
3.3.2.3	Full	4.14, 4.15
3.3.2.4	Full	4.10, 4.11, 4.27, 4.29
3.3.2.5	Full	4.14, 4.15
3.3.2.6	Full	4.10, 4.11, 4.12, 4.13
3.3.2.7	Full	3.01
3.3.2.8	Full	4.11, 4.13, 4.15
3.3.2.9	Full	4.12, 4.13
3.3.2.9.1	Full	4.10, 4.11
3.3.2.10	Full	4.13
3.3.2.11	Full	3.13, 3.14, 3.15
3.3.2.12	Full	4.34
3.3.2.13	Full	3.01
3.3.2.14	Full	3.01
3.3.2.15	Full	3.01, 4.20, 4.29, 4.30, 4.32
3.3.2.20	Full	3.01
3.3.2.23	Full	3.01, 3.07, 3.09, 3.12, 3.13, 3.14, 3.15, 4.16, 4.17, 4.18, 4.19
3.3.2.25	Partial	3.01
3.3.2.26	Full	3.01
3.3.6.2	Partial	3.01
3.3.6.8	Partial	1.01, 1.03, 7.04, 7.06
3.3.6.9	Partial	7.04
4.1.6	Partial	S3.03
4.3.3	Full	S3.03

Glossary

AOS	Advanced Orbiting Systems
BCH	Bose-Chaudhuri-Hocquenghem
BER	Bit Error Rate
BIP	Build Implementation Plan
CADU	Channel Access Data Unit
CCSDS	Consultative Committee for Space Data Systems
CRC	Cyclic Redundancy Check
DAN	Data Availability Notice
DC	Direct Current
DFCB	Data Format Control Book
ETM+	Enhanced Thematic Mapper Plus
F&PS	Functional and Performance Specification
GTSIM	Generic Telemetry Simulator
ICCR	Internal Configuration Change Request
LGS	Landsat 7 Ground Station
LPS	Landsat 7 Processing System
Mbps	Megabits per second
MFP	Major Frame Processing
MSCD	Mirror Scan Correction Data
PCD	Payload Correction Data
PID	Process ID
PN	Pseudo-random Noise
RDCS	Raw Data Capture Subsystem
RDP	Raw Data Processing
SQL	Structured Query Language
VCDU	Virtual Channel Data Unit
VCID	Virtual Channel Identifier